

REMARKS

The Office Action indicated that the subject matter of claims 2, 4, 5 and 15-16 would be allowed if rewritten in independent form and that claims 17 and 19 are allowed. Applicants would request that the indicated allowed subject matter in the dependent claims be held in abeyance until the following remarks are considered.

The conventional bonding processes have been disclosed in Figures 7A, 7B, 8 and 9 in the present application. Figures 7A and 7B have been defined as representative of U.S. Patent No. 6,036,080. This art is also likewise similar to the other cited *Takahashi et al.* U.S. Patent No. 6,080,651 that has been contended to anticipate or in combination to render obvious the claims in the present invention.

The method of bonding of wires and the resulting apparatus configuration in the semiconductor field has been reviewed by numerous engineers and scientists due to the large consumer and industrial applications that rely upon bonding wires to semiconductor devices.

The present invention defines one end of the wire as forming a bonding point which conventionally is described as a ball, although obviously not necessarily a ball configuration in this art. It is known to extend the wire from the ball in one direction and then redirect the wire to form a neck portion to accommodate the congestion of multiple wire connections to a semiconductor device.

The cited *Takahashi et al.* art is directed specifically to wire bonding methods that teach not only the use of a capillary which can be moved along the length of the wire to facilitate the bonding of the semiconductor but also can be moved laterally to reconfigure the wire, for example, to produce a neck or kink, as known in the art. The teachings of the *Takahashi et al.* U.S. Patent No. 6,080,651 are primarily directed to providing an order of bonding, that is the

manner in which the bonding is effectuated from a first bonding point on the semiconductor device to the final bonding point.

As shown in Column 4, lines 4-16, the '651 patent invention contemplates bonding at a first point and then sequentially bonding to the center of the row and then bonding from the other end of the row with appropriate bending of the wires at angles to accommodate the congestion of the bonding row. In essence, the bonding works from one end to the middle and then proceeds to work from the other end to the middle to improve the manufacturing process.

It is clear that there is no teaching of extending a wire from the ball bonding point and then crushing or bending the wire back to contact the ball point as the wire extends in a different direction.

The present invention provides a neck, which by definition is a bending of the wire to extend in a different direction from the proceeding wire that approaches the neck point and the wire extending downstream or at the distal portion from the neck to contact the bonding point at a position displaced from the wire extending initially from the ball.

None of the references of record recognize the forming of crushed point downstream or at the distal portion from the neck relative to the initial bonding or ball point with the wire.

The *Takahashi* U.S. Patent No. 6,036,080 discloses a method of moving a capillary to provide a "strong kink" at the upper most point of the neck height so that a high shape retention force is provided in the wire loop shape. Purportedly, the invention exists in a reverse operation movement of a capillary in a direction opposited from a second bonding point during the loop formation. Reference can be made to the schematic travel path shown in Figures 3, 4, and 5 of the '080 patent. Compare such movements with, for example, the disclosure in Figure 2 of the

present invention and it is clearly seen that the '080 patent neither suggests nor anticipates the features of the present invention.

The Office Action referred to Column 1, lines 58-61 of U.S. Patent No. 6,080,651 to purportedly show the presence of a crushed part in a manner similar to the present invention. A close review, however, simply indicates that this is the prior art manner in which a ball is formed at the tip of the wire by movement of the capillary 6 to create the press-bonded ball. Likewise, U.S. Patent No. 6,036,080 merely discloses the ball being formed at the tip of the wire in a bonding procedure. See Column 1, lines 35-36 and Column 2, lines 66-67. Thus, disclosures relied upon in the Office Action are simply directed to an initial forming of the bonded balls having a somewhat flat shape or hemispherical shape in their drawings.

The present claims 1 and 14 have been amended to clearly distinguish over the prior art methods disclosed in the cited references.

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It is believed that the case is now in condition for allowance and an early notification of the same is requested. If the Examiner believes a telephone interview will help further the prosecution of this case, the undersigned attorney would appreciate a telephone conference.

I hereby certify that this correspondence is being deposited with the United States Postal Service as First Class Mail in an envelope addressed to the Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450 on December 10, 2004.

By: Sharon Farnus




Signature

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Very truly yours,

SNELL & WILMER L.L.P.



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